GCU Glasgow Caledonian University

University for the Common Good

The reliability of the McCabe score as a marker of co-morbidity in healthcare-associated infection point prevalence studies

Reilly, J. S.; Coignard, B.; Price, L.; Godwin, J.; Cairns, S.; Hopkins, S.; Lyytikäinen, O.; Hansen, S.; Malcolm, W.; Hughes, G. J.

Published in:
Journal of Infection Prevention

DOI:
10.1177/1757177415617245

Publication date:
2016

Document Version
Author accepted manuscript

Link to publication in ResearchOnline

Citation for published version (Harvard):
Reilly, JS, Coignard, B, Price, L, Godwin, J, Cairns, S, Hopkins, S, Lyytikäinen, O, Hansen, S, Malcolm, W & Hughes, GJ 2016, 'The reliability of the McCabe score as a marker of co-morbidity in healthcare-associated infection point prevalence studies', *Journal of Infection Prevention*, vol. 17, no. 3, pp. 127-129. https://doi.org/10.1177/1757177415617245

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
If you believe that this document breaches copyright please view our takedown policy at https://edshare.gcu.ac.uk/id/eprint/5179 for details of how to contact us.

Download date: 05. May. 2023

The reliability of the McCabe score as a marker of co-morbidity in healthcare-associated infection point prevalence studies

JS Reilly, B Coignard, L Price, J Godwin, S Cairns, S Hopkins, O Lyytikäinen, S Hansen, W Malcolm, GJ Hughes

Abstract

This study aimed to ascertain the reliability of the McCabe score in a healthcare-associated infection point prevalence survey. A 10 European Union Member States survey in 20 hospitals (n=1912) indicated that there was a moderate level of agreement (κ =0.57) with the score. The reliability of the application of the score could be increased by training data collectors, particularly with reference to the ultimately fatal criteria. This is important if the score is to be used to risk adjust data to drive infection prevention and control interventions.

Introduction

The classic McCabe-Jackson criteria to predict the likelihood for survival of patients with gram-negative bacteraemia on the basis of the level of underlying disease was first developed based on observations of endotoxin tolerance in humans (McCabe and Jackson 1962). In healthcare-associated infection (HAI) point prevalence survey it is used as a subjective score of underlying illness severity. This simple method of classifying patients according to a prognosis of: rapidly fatal (< 1 year), ultimately fatal (1-4 years), and nonfatal (>5 years), has been shown to be a better predictor of survival than the APACHE II score (Perl et al 1995). More recently it has been demonstrated to be a strong determinant of septic shock related mortality (Delodder et al 2011). It has also been modified for use in intensive care units with the original three-group classification into a four-group model by splitting the 'ultimately fatal' prognosis into a 'long-term' (> 6 months) and a 'short-term' prognosis (< 6 months) (Fernandez et al 2006).

With respect to HAI in the hospital setting it has been shown to correlate with the prevalence of HAI in Finland (Lyytikäinen et al 2008) and France (Thiolet et al 2007) and more recently in a pilot of the European PPS (Zarb et al 2012), and with specific types of HAI in specific settings such as UTI in surgical settings (Medina et al 1997). It is therefore a potentially important tool for risk stratification in infection prevention and control. However, little is known about the reliability of the measure itself.

As the McCabe score is seen as a subjective measure of clinical prognosis, the validity and reliability of this measure in studies of HAI is important to ascertain. We have previously reported on the results of a pilot PPS validation study in Europe (Reilly et al 2015). Here we report on the reliability of the recording of the McCabe score in data collected for the European PPS.

Methods

A validation study of the PPS for HAI was carried out in ten European Union Member States. Each contributed data for a minimum of 200 patients from at least two hospitals. The McCabe score was collected from information in the medical records or through discussion with the medical staff in the ward.

The reference (gold standard), for the validation process was the ECDC-PPS protocol and codebook (ECDC 2011) applied by a validation team of at least one trained expert external from (and/or acting on behalf of) the national/regional PPS coordinating centre. This expert was accompanied by a hospital infection control team member who had undertaken the primary PPS data collection, for the purposes of access and orientation. Identical data collection was conducted by the validator. Patient notes, nursing notes, hospital information systems and clinicians were the data sources. Ethical approval was obtained from Glasgow Caledonian Ethics Committee and approval for data collection was secured by each member state to comply with local requirements however no personal identifying information was transferred to the authors from the local data collection teams".

Concordance between the validator and primary collectors were analysed using the kappa statistic (κ). The record matching and subsequent analyses were performed using bespoke software written *ab initio* in FORTRAN 95 and run under OpenVMS on a Compaq Alpha system. Interpretation of κ was (κ: 0.81-1.00 is excellent, 0.61-0.80 is good, 0.41-0.60 is moderate, 0.21-0.40 is fair/marginal, <0.2 is poor agreement; negative values are possible and also denote 'poor').

Results

Of the 3,958 patient records, a total of 1,950 were selected for validation in accordance with the calculated study sample size. Of those, 1,912 were matched to the primary dataset, since it was not possible to link all patient records due to errors in data entry or missing data.

McCabe scores were recorded in both the primary and validation datasets in 1526/1912 (79.8%) of all recorded data. For the remainder around 16.7% were unknown, due to lack of information in the medical records or the clinician not being available to calculate the score, either by the primary data collector and/or the validation data collector and 3.5% were unmatched (primary/ validation) data. There was minimal variation in McCabe completion by European Union Member State. Table 1 presents the data by category of McCabe score. The McCabe score had moderate levels of agreement in the dataset where all responses were considered inclusive of the unknowns ($\kappa = 0.57$).

Table 1 McCabe score by primary and validation data collection

McCabe Score	**Validation**				
Primary data collection	Non fatal	Rapidly Fatal (within 1 year)	Ultimately fatal (within 5 years)	Unknown	Total
Non fatal	961 (94%)	9 (8%)	49(13%)	194	1213
Rapidly Fatal	8(1%)	81(72%)	19 (5%)	2	110
Ultimately fatal	56(5%)	23(20%)	320 (82%)	15	414
Unknown	60	1	29	19	109
Total	1085	114	417	230	1846[a]

[a] 66 not matched

Where the McCabe score was either classified by the data collector or provided by the clinician (n=1526), the levels of agreement between the primary data collector and validator were: 94% (961/1025) for non fatal, 72% (81/113) for rapidly fatal, 82% (320/388) for ultimately fatal (Table 1). The McCabe score had good agreement in the dataset when unknowns were removed from the analysis ($\kappa = 0.78$).

Discussion

The McCabe score is a useful predictor of risk for infection in selected settings in published studies (Perl et al 1995; Medina et al 1997; Fernandez et al 2006; Thiolet et al 2007; Lyytikäinen [et] al 2008; Delodder et al 2011; Zarb et al 2012). However, this study is the first to formally assess its reliability in an HAI prevalence study in the hospital setting. The results show a moderate level of agreement overall when all data were taken account of, inclusive of unknowns by either the primary or validation data collector (κ 0.57).

Variation in agreement was noted by category of McCabe. Rapidly fatal had poorer levels of agreement (72%) than other categories, whereas non-fatal had high levels of agreement (94%). This variation indicates that some of the categories of McCabe may be easier to interpret than others and suggests that data collectors, perhaps especially if they are not clinicians, may have difficulties in assessing a patient's short-term prognosis. Importantly, the McCabe score had good level of agreement in the dataset where both primary and validator data collectors had recorded the result (κ = 0.78).

The McCabe score requires abstractor judgement, usually involving verification with a clinician present on the ward. This means that data collectors may record 'unknown' when they are unsure of the score or unable to find the information required to calculate the score. These results indicate that investment in training of data collectors in the McCabe classification would be worthwhile to maximise data completion and enhance the reliability of the data. Reliable recording of this score will enable risk adjustment for infection prevention and control assessment.

Conflicts of interest. The authors declare that there is no conflict of interest.

References

Delodder F Que YA Revelly JP Eggimann P (2011) McCabe score as a strong determinant of septic shock-related mortality. *Biomedcentral proceedings* **5**(Suppl 6): 74

European Centre for Disease Prevention and Control (2011) Point prevalence survey of healthcare-associated infections and antimicrobial use in European acute care hospitals Protocol version 4.2. Stockholm, Sweden.

Fernandez R Baigorri F Navarro G Artigas A (2006) A modified McCabe score for stratification of patients after intensive care unit discharge: the Sabadell score. *Critical Care* **10**: R179.

Lyytikäinen O Kanerva M Agthe N Möttönen T, Ruutu P (2008) Finnish Prevalence Survey Study Group. Healthcare-associated infections in Finnish acute care hospitals: a national prevalence survey 2005. *Journal of Hospital Infection* **69 (3)**: 288-94

Medina MMartínez-GallegoG Sillero-Arenas M Delgado-Rodríguez M (1997) Risk factors and length of stay attributable to hospital infections of the urinary tract in general surgery patients. *Enfermedades Infecciosas y Microbiología Clínica* 15 (6) :310-4

McCabe WR and Jackson GG (1962) Gram-negative bacteremia. I. Etiology and ecology. *Archives Internal Medicine* **110(6)**: 847-53.

PerlTM Dvorak L Hwang TWenzel RP (1995) Long-term survival and function after suspected gram-negative bacteremia. *Journal American Medical Association* **274 (4)**: 338-45.

Reilly JS Price L Godwin J Cairns S Hopkins S Cookson B Malcolm W Hughes G Lyytikaïnen O Coignard , Hansen , Suetens C (2015) National Participants in the ECDC pilot

validation study. A pilot validation in 10 European Union Member States of a point prevalence survey of healthcare-associated infections and antimicrobial use in acute hospitals in Europe, 2011. *Eurosurveilancel* 20(8): pii=21045

Thiolet JM Lacavé L Jarno P Metzger MH Tronel H Gautier C L'Heriteau F Coignard B(2007) Prévalence des infections nosocomiales France 2006. Bulletin épidémiologique hebdomadaire ; 51-52: 429-32

Zarb P Coignard B Griskeviciene J Muller A Vankerckhoven V Weist K Goossens MM Vaerenberg S Hopkins S Catry B Monnet DL Goossens H Suetens C (2012) The European Centre for Disease Prevention and Control (ECDC) pilot point prevalence survey of healthcare-associated infections and antimicrobial use. *Eurosurveillance* ;**17**(46):20316